The First World Vocational College Skills Competition Competition Rules

I. Name of the Skill

No.: W08

Chinese name: 信息技术应用创新

English name: Innovations in Information Technology Applications

Industry: Electronics and information

II. Competition Purpose

The World Vocational College Skills Competition aims to bring together standards, technologies, equipment, teachers and students in the field of vocational and technical education at home and abroad, adhere to promoting Chinese vocational education to go global and serve international cooperation in production capacity, build an important platform for teachers and students of international vocational schools to deepen friendship, exchange skills and show styles, and promote the construction of a world community of skills. Through skills competitions, displays and experience exchanges, the best practices of international vocational and technical education are shared, the influence of Chinese vocational and technical education in the world in this field is enhanced, and China's vocational and technical education is aligned with global vocational and technical education.

The Innovations in Information Technology Applications Skill Competition in the First World Vocational College Skills Competition (the "Competition") mainly targets domestic and foreign students from vocational schools worldwide, who specialize in information technology (IT)-related majors. It aims to guide vocational schools to closely align with the industry and innovation chains of the new-generation IT innovation industry regarding

their development of IT-related majors. Meanwhile, it intends to stimulate students to strengthen their abilities in the application and development of innovative IT products, enhance the match between students' professional competence and quality and what enterprises require, and prepare students for a new round of technological revolution and industrial change as well as new economic progress. Moreover, under the new situation, the Competition is designated to make a contribution to comprehensively reinforcing the quality of teaching of IT-related majors, expanding employment and entrepreneurship, and deepening internationalization. Furthermore, the Competition will promote economic transformation and upgrading and cultivate driving forces for economic development. This is a team competition. Each team must include both Chinese and foreign students. The purpose of this practice is to break technological barriers, achieve win-win results, boost the building of an international talent ecosystem in the IT innovation industry, and expedite the formulation of standards for IT innovation equipment and relevant technologies. In addition, the Competition will uphold the spirit of "openness and cooperation" of international top competitions, serve national strategies, and deepen industry-education integration. It will participate in the "Belt and Road" Initiative, push forward the educational reform integrating "posts, curriculum systems, competitions and certificates", and promote reform and development through competition. Concurrently, the adaptability of vocational education will be intensified practically, and "international" talent will be cultivated to have excellent technical skills, an international vision and a good knowledge of international rules. Besides, the Competition is designed to improve the quality and international influence of vocational skill competitions in countries around the world.

III. Competition Content

The Competition focuses on the assessment of competitors' comprehensive

practical skills in the comprehensive routing of the machine rooms at IT innovation data centers, the combination of IT innovation equipment, the management and maintenance of IT innovation systems, the technology and testing of network penetration regarding IT innovation, the deployment of policies for network system security, system reinforcement and information protection in line with classified protection requirements and the operation, maintenance and management of network security. Specifically:

(I)   Competitors can realize the comprehensive routing of IT innovation machine rooms, combine IT innovation equipment, and connect IT innovation servers, based on business needs and the actual engineering application environment, and achieve the interconnection of equipment through debugging.

(II)   Additionally, competitors can configure protocols and services on the IT innovation network equipment and servers provided by the Competition, use Python to write relevant operation and maintenance programs, as needed, to manage the network and ensure the efficient operation of the IT innovation network system, and configure security policies, according to network business requirements, to build a network that meets the application requirements.

(III) Moreover, competitors can formulate and implement security policies, in accordance with security threats during the actual operation of the network system and classified protection requirements so as to reinforce the system and prevent and address malicious network intrusions and attacks.

(IV) Teams will engage in IT innovation security confrontations. While protecting their own servers, teams should penetrate other teams' servers. The corresponding marks will be deducted from teams whose servers are penetrated. Competition results will be displayed on large screens in rest areas or in other ways.

(V)   Application of artificial intelligence in IT innovation security. Machine learning algorithms, such as regression analysis, cluster analysis, time series analysis and neural networks, will be employed to create a system that

can identify malicious URLs, detect fraud emails, junk mails and Trojans, and detect and warn any malicious activities on the network. The specific assessment content is as follows:

1. Competitors can use Python to realize AI algorithms, such as k-Nearest Neighbor (KNN), decision trees (DTs), Naive Bayes, logistic regression, support vector machines (SVMs), K-Means, hidden Markov models and neural networks.

2. Competitors can utilize big data sets to train models detecting network security abnormalities.

3. Competitors can confirm whether there are abnormal network activities through models detecting network security abnormalities.

4. Competitors can establish models classifying and predicting network attacks.

5. Competitors can analyze security loopholes in AI algorithms.

(VI) Mark weights and time distribution of the Competition

Domestic:

No.	Module content	Competition duration
Phase I Weight 60%	Combination and launch of IT innovation equipment, routing and link testing Weight: 10%	240 min
	Configuration, installation and adaption of IT innovation equipment, and system operation, maintenance and application Weight 45%	
	Professional quality	

	Weight 5%	
Phase II Weight 40%	Capture the Flag Challenge (CTF) of IT innovation Weight 40%	120 min

Overseas:

No.	Module content	Competition duration
Phase I Weight 60% (overseas)	IT innovation theory	60 min
Phase II Weight 40%	Capture the Flag Challenge (CTF) of IT innovation Weight 40%	120 min

IV. Competition Method

i. Team requirements

1. This competition is a team competition, and the Competition adopts "1 + 1" Chinese and foreign joint teams, that is, a team consists of one group of Chinese competitors (from Chinese schools) and one group of foreign competitors(from foreign schools); each group consists of two students. Domestic students in each group are not allowed to come from different schools. Competitors should sign up, compete and win prizes by teams.

2. Chinese competitors must be current full-time students from higher vocational colleges and schools (including current full-time students of the higher vocational education category from undergraduate universities).

3. Foreign competitors must be registered foreign students in related majors of vocational schools, or colleges and universities providing vocational education, and international students of undergraduate schools in China are also encouraged to participate.
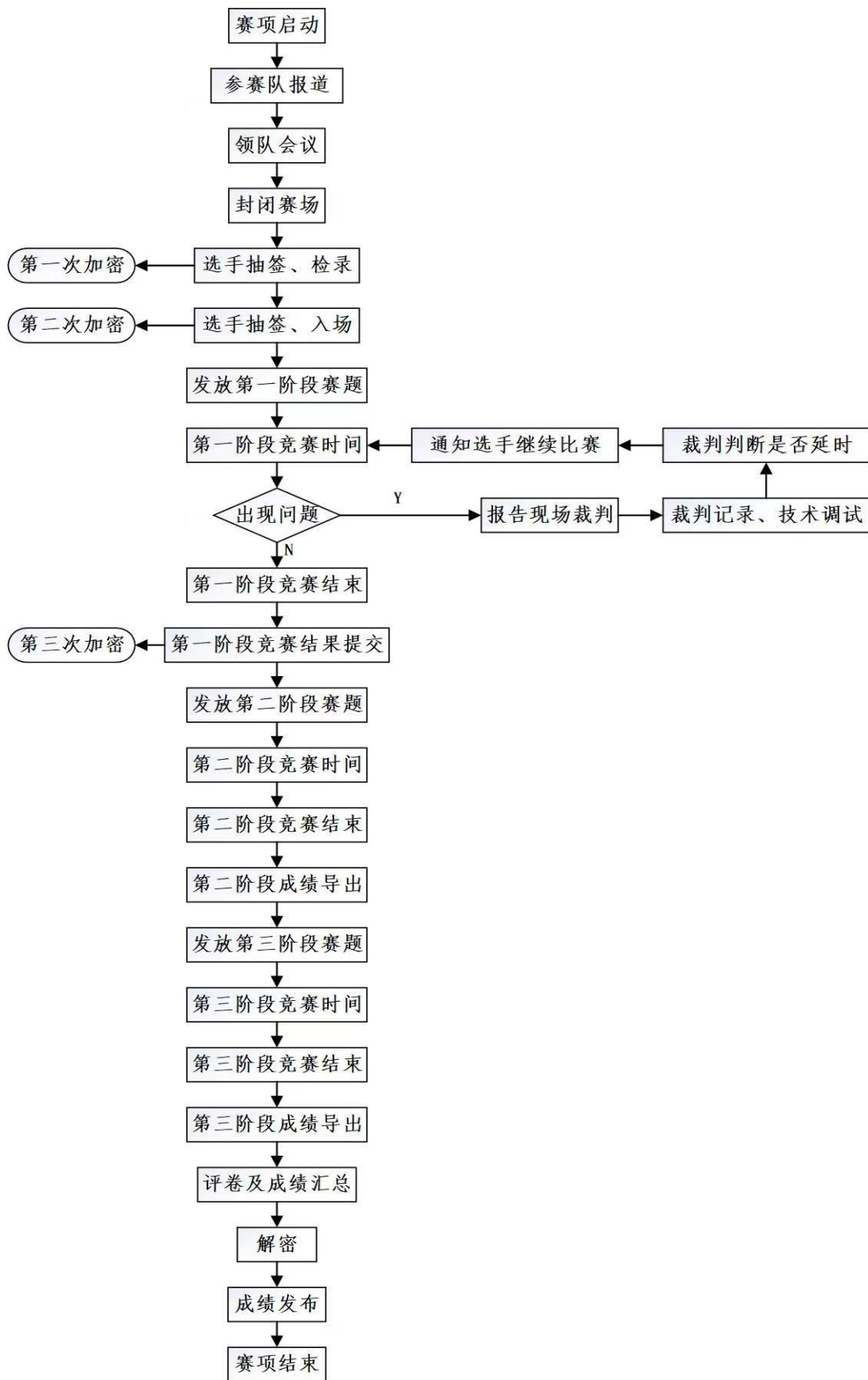
4. Competitor replacement: If a competitor is unable to participate for any reason during the preparation, the relevant department should issue a written explanation ten working days before the start of the corresponding Competition. The competitor will be replaced after verification by the office of the Executive Committee. After the Competition starts, the team is not allowed to replace the competitor.

ii. Competition method

The Competition will be conducted in the forms of on-site Competition + recorded broadcast. Domestic teams will compete on site. The participating teams will set up the standards for the online competition environment, arrange the competition venue and participate in the competition online. Each participating school shall set up a competition venue in its own school or other venues approved by the World Schools Competition Executive Committee, start the competition uniformly at the specified time, broadcast the competition live, and submit the recorded video within the specified time after the end of the competition. If the foreign participating groups cannot come to the live competition, the competition shall be recorded and broadcasted. If foreign teams are unable to attend the on-site competition, they will compete through recorded broadcast. Foreign teams must send the Competition videos that meet the requirements to the mailbox designated by the Executive Committee of the Competition ("Executive Committee") seven days before the official Competition day, and the Executive Committee will check and try to broadcast the videos and seal them for records in a uniform manner. On the official competition day, the videos should be unsealed by the jury, and those from the foreign competitors should be broadcast on the big screen on site. The marking criteria should be the same as those for on-site competition. Requirements for Competition videos: The file format is MP4; the resolution is no less than 1280 * 720, the recommended aspect ratio is 16:9, and the video content needs to fully display the Competition process.

V. Competition Process

i. Competition Process Flow Chart

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                          ┌──────────┐
                          │ 赛项启动 │
                          └────┬─────┘
                          ┌────▼─────┐
                          │ 参赛队报道│
                          └────┬─────┘
                          ┌────▼─────┐
                          │ 领队会议 │
                          └────┬─────┘
                          ┌────▼─────┐
                          │ 封闭赛场 │
                          └────┬─────┘
   ╭──────────╮        ┌──────▼────────┐
   │ 第一次加密│◄──────│ 选手抽签、检录│
   ╰──────────╯        └──────┬────────┘
   ╭──────────╮        ┌──────▼────────┐
   │ 第二次加密│◄──────│ 选手抽签、入场│
   ╰──────────╯        └──────┬────────┘
                    ┌─────────▼──────────┐
                    │ 发放第一阶段赛题   │
                    └─────────┬──────────┘
   ┌──────────────────┐  ┌────▼──────────────┐  ┌──────────────────┐  ┌──────────────────┐
   │第一阶段竞赛时间   │◄─│ 通知选手继续比赛  │◄─│ 裁判判断是否延时 │
   └────────┬─────────┘  └───────────────────┘  └────────▲─────────┘
        ┌───▼────┐  Y   ┌──────────────┐   ┌──────────────────┐
        │出现问题│─────►│ 报告现场裁判 │──►│ 裁判记录、技术调试│
        └───┬────┘      └──────────────┘   └──────────────────┘
          N │
   ┌────────▼─────────┐
   │ 第一阶段竞赛结束  │
   └────────┬─────────┘
   ╭──────────╮  ┌────▼──────────────────┐
   │ 第三次加密│◄─│ 第一阶段竞赛结果提交  │
   ╰──────────╯  └────┬──────────────────┘
             ┌────────▼─────────┐
             │ 发放第二阶段赛题  │
             └────────┬─────────┘
             ┌────────▼─────────┐
             │ 第二阶段竞赛时间  │
             └────────┬─────────┘
             ┌────────▼─────────┐
             │ 第二阶段竞赛结束  │
             └────────┬─────────┘
             ┌────────▼─────────┐
             │ 第二阶段成绩导出  │
             └────────┬─────────┘
             ┌────────▼─────────┐
             │ 发放第三阶段赛题  │
             └────────┬─────────┘
             ┌────────▼─────────┐
             │ 第三阶段竞赛时间  │
             └────────┬─────────┘
             ┌────────▼─────────┐
             │ 第三阶段竞赛结束  │
             └────────┬─────────┘
             ┌────────▼─────────┐
             │ 第三阶段成绩导出  │
             └────────┬─────────┘
             ┌────────▼─────────┐
             │ 评卷及成绩汇总    │
             └────────┬─────────┘
                  ┌───▼────┐
                  │  解密  │
                  └───┬────┘
               ┌──────▼──────┐
               │  成绩发布   │
               └──────┬──────┘
               ┌──────▼──────┐
               │  赛项结束   │
               └─────────────┘
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赛项启动	Competition launch

参赛队报道	Registration of participating team
领队会议	Team leader meeting
封闭赛场	Enclosed workshop
选手抽签、检录	Draw and check in for competitors
选手抽签、入场	Draw and entry for competitors
发放第一阶段赛题	Phase I Test Projects distributed
第一阶段竞赛时间	Competition duration for Phase I
第一次加密	The first encryption
第二次加密	The second encryption
通知选手继续比赛	Inform the competitors to continue to compete
裁判判断是否延时	The judges judge whether there is a delay
裁判记录、技术调试	Judges record and the technical debugging
报告现场裁判	Report to the on-site judges
出现问题	Problems arise
第一阶段竞赛结束	End of the Competition Phase I
第一阶段竞赛结果提交	Submit the results of the Competition Phase I
第三次加密	The third encryption
发放第二阶段赛题	Phase II Test Projects distributed
第二阶段竞赛时间	Competition duration for Phase II
第二阶段竞赛结束	End of the Competition Phase II
第二阶段成绩导出	Phase II results are exported
发放第三阶段赛题	Phase III Test Projects distributed
第三阶段竞赛时间	Competition duration for Phase III
第三阶段竞赛结束	End of the Competition Phase III
第三阶段成绩导出	Phase III results are exported
评卷及成绩汇总	Marking and summary of results
解密	Decryption
成绩发布	Result announcement
赛项结束	End of the Competition

ii.   Competition timeline

The Competition is held for two sessions within one day, with a competition duration of six hours domestically and three hours overseas. The detail is listed as follows:

Domestic:

Date	Time	Item	Participant	Site

One day before the Competition	09:00-12:00	Work meeting for judges	Jury president, judges and supervision and arbitration team	Online and offline
	13:00-14:30	Team leader meeting	Team leaders and jury president	Online
	15:00-16:00	Confirmation of the workshop environment	Team leaders, on-site judges and supervision and arbitration team	Online and offline
	16:00	Inspection on the enclosed workshop	Jury president and supervision and arbitration team	Online
The Competition day	07:30	Judges enter the judge's room	Jury president, on-site judges and supervision and arbitration team	Offline
	08:00-08:45	Competitors' check-in, the first encryption and confirmation of the workshop environment	Competitors, encryption judges, and the support team	Online and offline
	08:45-08:55	Declaration of the Competition Notice for Phase I	Competitors and jury president	Online and offline
	08:55-09:00	Distribution time of Phase I Test Projects	Competitors and on-site judges	Online and offline
	09:00-13:00	Competition duration for Phase I	Competitors and on-site judges	Online and offline
	13:00-13:50	Submission of Phase I results and the result evaluation of the on-site part; The second encryption; Upload of the screen recording files;	Competitors and on-site judges	Online and offline
	13:50-13:55	Declaration of the Competition Notice for Phase II	Competitors and on-site judges	Online and offline
	13:55-14:00	Distribution time of Phase II Test Projects	Competitors and on-site judges	Online and offline
	14:00-16:00	Competition duration for Phase II	Competitors and on-site judges	Online and offline

	16:00-16:20	Derivation of Phase II results	On-site judges	Online and offline
	16:20-end of review	Aggregation, deciphering, reporting and announcement of results	Marking judges, jury president, experts and supervision and arbitration team	Online
One day after the Competition	9:30-10:00	Closing ceremony	Leaders, guests, judges, teams and the expert panel	Online and offline

Overseas (GTM+8, Beijing Time):

Date	Time	Item	Participant	Site
The Competition day	14:20-14:55	Competitors' check-in and the first encryption	Competitors and online judges	Online
	14:55-15:00	Declaration of the Competition Notice for Phase I	Competitors and online judges	Online
	15:00-16:00	Competition duration for Phase I	Competitors and online judges	Online
	16:00-16:10	System switching	Technical personnel and online judges	Online
	16:10-18:10	Competition duration for Phase II	Competitors and online judges	Online
	18:10-19:00	The second encryption; Upload of the screen recording files;	Competitors and online judges	Online
	19:00-end of review	Derivation, aggregation, deciphering, reporting and announcement of results	Marking judges, jury president,	Online

			experts and supervision and arbitration team	

VI.

Competition Task Paper

i. The expert panel under the Executive Committee of the Competition ("Executive Committee") will prepare Test Projects.

ii. Competition Task Paper is made public one month before the start of the Competition.

iii. Competition Task Paper is made public through the online information release platform designated by the Competition.

VII. Competition Rules

i. The competition workstation is decided by drawing lots, and the competitors are not allowed to leave the competition workstation during the Competition.

ii. The hardware equipment, system software and auxiliary tools required for the Competition are arranged by the Executive Committee. Competitors are not allowed to bring their own hardware equipment, software, mobile storage, auxiliary tools and mobile communication devices to the workshop.

iii. Teams determine their respective work allocation, work procedures and time schedules.

iv.Teams enter the competition workstations and receive the Test Project ten minutes before the start of the Competition, and can only carry out the related work after the Competition officially begins.

v. During the Competition, competitors must strictly abide by the operating procedures to ensure personal and equipment safety, and are subject to the supervision and warning of the judges. If the Competition cannot be continued due to equipment failure or damage caused by competitors, the jury president has the right to terminate the team's competition; if the equipment

failure is not resulted from the fault of competitors, the jury president will decide on a case-by-case basis.

vi. After the Competition is finished (or completed earlier), teams should confirm that they have successfully submitted all the competition documents, and judges and team leaders should sign together and confirm (the workstation number should be signed by team leaders). The teams should not perform any further operations after the confirmation.

vii. The final competition results will be published in paper form to all teams at the designated place and announced at the closing ceremony after the final competition results are reviewed, confirmed and signed by the jury president and the chief arbitrator.

viii. The final results of the teams in the category are entered into the competition administration system by the organizer's information officer. After reviewing the result data, the organizer's information officer will export and print the results recorded in the competition administration system, and the jury president of the Competition will sign after reviewing and approving the results. The organizer's information officer will upload the electronic version of the Competition results information confirmed by the jury president into the competition administration system, and also submit the paper printed report card signed by the jury president to the Executive Committee of the First World Vocational College Skills Competition.

ix. After the end of the Competition, the expert panel will analyze the competitors' mastery of various knowledge points and techniques during the Competition according to the judge's marking, and submit the analysis report to the Office of the Executive Committee of the World Vocational College Skills Competition, which will publish it in due course according to the actual situation.

x. The original marking documents and final results of each session will be signed by the staff of supervision and arbitration team and the jury president

and then sealed in a bag and archived by the host schools of the Competition. These materials will be kept in a safe place by designated personnel.

xi. Competition requirements

1. Competitors and coaches must comply with the Skill-Specific Competition Rules and related requirements.

2. Team leaders are responsible for managing the competitors and coaches on behalf of the participating countries, and should strictly abide by the relevant provisions of the competition policy. They should effectively manage the competitors and comply with the appeal and supervisory arbitration procedures.

3. Experts, judges, supervisors and arbitrators must abide by the competition policy, perform their duties according to the policy, strictly enforce the confidentiality policy, abide by the competition rules, and perform their duties fairly and impartially.

4. Staff must abide by the rules and policies and conscientiously perform their responsibilities during the Competition.

VIII. Competition Environment

Competition workstations are furnished with operating platforms. Each workstation is equipped with 220 V power supply, and the cable lines in the workstations should conform to the safety standards. The area of each competition workstation is ≥ 16 ㎡ to ensure that the teams do not disturb each other. The competition workstations are marked with the workstation number and fitted with the competition platform and the software and hardware required for the technical work. Environmental standards require that the workshop be well lit (greater than 500 lux), illuminated and ventilated; each team is provided with a litter box.

In addition to the competition workstations, the results display area, experience area, competitor rest area, judge rest area and material preparation area are also designated. The results display area mainly shows supporting teaching materials and resource packages; the experience area mainly exhibits competition equipment, related new technologies and products, and the real-time progress of information security attack and defense battles.

IX. Technical Specifications

I. The information network security engineering involved in the Competition mainly has the following 15 standards in the design and formation process, and the teams should comply with the following specifications in the implementation of the competition project:

No.	Standard No.	Name of standards
1	GB 17859-1999	Grading Criteria for Computer System Security Protection
2	GB/T 20271-2006	Information Security Technology—Common Security Technical Requirements for Information Systems
3	GB/T 20270-2006	Information Security Technology—Basic Security Technical Requirements for Networks
4	GB/T 20272-2006	Information Security Technology—Security Technical Requirements for Operating Systems
5	GB/T 20273-2006	Information Security Technology—Security Technical Requirements for Database Management System
6	GA/T 671-2006	Information Security Technology—Technical Requirements for the Security Grading of Terminal Computer Systems
7	GB/T 20269-2006	Information Security Technology—Security Management Requirements for Information Systems
8	ISO OSI	Open System Interconnection (OSI) Model
9	IEEE 802.1	Overview, System Structure, Management and Performance Measurement of Local Area Networks (LANs)

10	IEEE 802.2	Logical Link Control (LLC)
11	IEEE 802.3	Bus Network Medium Access Control Protocol, Carrier-sense Multiple Access with Collision Detection (CSMA/CD), and Technical Specifications for the Physical Layer
12	IEEE 802.6	Metropolitan Area Networks Medium Access Control Protocol—Distributed-queue Dual-bus Network (DQDB) Access Method and Physical Layer Technical Specifications
13	IEEE 802.10	Security Technical Standards for Local Area Networks (LANs)
14	IEEE 802.11	Medium Access Control Protocol of Wireless Local Area Networks (LANs)—Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA) and Physical Layer Technical Specifications
15	BG/T 22239-2008	Information Security Technology—Baseline for Classified Protection of Information System

ii. The knowledge and technical points involved in the category are as follows:

No.	Module content	Notes
Phase I	Installation and launch of the IT innovation server	Be able to complete the launch, connection, module installation and optoelectronic link testing of IT innovation equipment, according to routing specifications
	Configuration of the IT innovation operating system	Be able to complete the installation of software to the IT innovation server based on domestic chip architecture, such as Phytium, Kunpeng, Loongson, Zhaoxin, Sunway and Hygon. The software mainly involves server operating systems, desktop operating systems, cloud terminal operating systems and cloud platform management systems.
	Configuration of	Be able to complete the configuration and security

		the IT innovation network	management of the designated switch, router and firewall and achieve network connection, and able to complete the optimization of network configurations
		Operation and maintenance of the IT innovation system	Be able to complete the configuration and management of the IT innovation server system, the installation and debugging of the IT innovation database, storage configuration and management, network building and maintenance, virtualization and containers, the design and writing of Python programs for operation and maintenance, and the application of IT innovation products
		Professional quality	Awareness of specifications, security and disciplines
		IT innovation theory (overseas)	IT basic setting (CPU chip and server), basic software (data base and operating system), and elementary knowledge of application software (office software and government applications); Cybersecurity Law, Data Security Law, Classified Protection 2.0, professional ethics of information security personnel; Access Control, cryptology and VPN, and data analysis
Phase II		Capture the Flag Challenge (CTF) of IT innovation	CTF of IT innovation network equipment: MAC penetration testing DHCP penetration testing ARP penetration testing STP penetration testing VLAN penetration testing Penetration testing of routing protocols (RIPV2 and OSPF)
			CTF of the IT innovation operating system: Penetration testing of the service buffer overflow of the IT innovation operating system
			CTF of IT innovation application:

		Penetration testing of the SQL Injection vulnerability and its security programming
		Penetration testing of the Command Injection vulnerability and its security programming
		Penetration testing of the File Upload vulnerability and its security programming
		Penetration testing of the Directory Traversing vulnerability and its security programming
		Penetration testing of the Cross Site Script (XSS) vulnerability and its security programming
		Penetration testing of the Cross Site Request Forgeries (CSRF) vulnerability and its security programming
		Penetration testing of the Cookie Stole vulnerability and its security programming
		Penetration testing of the Session Hijacking vulnerability and its security programming
		Application of AI in information security
		Analysis and application of logs and network traffic

X. Technology Platform

   i.   Competition software

The Executive Committee provides personal computers (with an IT innovation operating system) for teams to build the competition operating environment and install common application software.

No.	Software
1	Operating System
2	Document editing tools
3	Equipment debugging and connection tools

The Executive Committee provides the environment of penetration test machine, target machine and virtual machine.

No.	Software
1	Operating system of the IT innovation client Kylin desktop edition V10
2	Operating system of IT innovation server Kylin server V10
3	Penetration tools: 1. Firefox and Hackbar plug-in unit 2. Burpsuite Jar Version 3. Windows Powershell, Linux Python Bash 5. Python27 python38 6. Gcc 7. Binwalk Foremost 8. Stegsolve.Jar 9. Firefox Firedbug plug-in unit 11. winhex Kylin linux can use Hexcurse 12.Curl tool (applicable to Windows and Linux) 13. Python2 numpy library 14. Python2 hashlib library 15. Wireshark notes 16.WPS office software, decompression software and common network tools 17. Chrome browser 18. Bless Okteta hexedit hexyl editor 19. PHP-CLI

ii. List of equipment for the Competition

No.	Equipment name	Quantity	Parameter
1	Multi-functional training frame	1	Open multi-functional training frame, including intelligent optoelectronic link testing equipment
2	IT innovation server KunTai R522	2	IT innovation 32-core CPU, 32G memory, 480G solid state disk (SSD)

3	IT innovation PC KunTai D526-2	2	IT innovation 4-core CPU, 8G memory, 256G SSD
4	IT innovation switch and route CS6200-54X-EI-XC	3	IT innovation routing switch (48 GE RJ45 electrical interfaces + six 10G SFP+ optical interfaces), with a built-in dual AC power supply

XI. Result Evaluation

i. Work principles for judges

A pool of judges for the Competition should be established in line with Management Measures for the Work of Experts and Judges. The jury president will be recommended by the Executive Committee of the Skill Competition to the Executive Committee of the World Vocational College Skills Competition and will be appointed by the latter. A sound jury is established before the Competition. Judges and supervisors adopt the working mode of combining centralization with dispersion. The jury follows the jury president responsibility system. Three arbiters, ten online judges (including the jury president), two encryption judges, 12 on-site judges and 12 on-site inspectors are set up for the Competition. According to the demand of the Competition, 32 judges are needed. Specifically, each team requires an on-site judge and an on-site inspector.

Encryption will be conducted three times. Upon encryption, competitors should not leave the workshop without permission. Three teams of encryption judges will perform encryption and manage the encrypted results. Supervisors should supervise the whole process of encryption.

The first team of encryption judges will organize competitors to draw lots for the first time to generate competition numbers that will replace competitors' personal identity information like the entry card. The judges will fill in the record sheet of the first encryption that, together with competitors' personal

identity documents like the entry card, will be put in the seal bag for the first encrypted results for separate storage.

The second team of encryption judges will organize competitors to draw lots for the second time to generate workstation numbers that will replace competitors' competition numbers. The judges will fill in the record sheet of the second encryption that, together with competitors' competition numbers, will be put in the seal bag for the second encrypted results for separate storage.

The third team of encryption judges will encrypt the submitted competition documents. They will determine the competition file numbers to replace workstation numbers, and fill in the record sheet of the third encryption that will be put in the seal bag for the third encrypted results for separate storage.

The seals of all the seal bags of encrypted results should be signed by the corresponding encryption judges and supervisors. The seal bags should be kept by encryption judges in the safe in the confidential room, under the supervision of supervisors.

Requirements for judges of the Competition are listed below:

No.	Professional and technical directions	Requirements for knowledge and competence	Judging, teaching and work experience	Professional and technical titles (level of professional qualification)	Head count
1	Majors related to information security, the Internet of Things (IoT) and computer	1. Theoretical knowledge, practical skills and work experience in the major. 2. High organization,	Understanding and accurate and proficient use of the policies, rules and judging	In principle, a professional qualification of technician or above (vocational skill level) or a professional technical position	2

	networks	collaboration and communication abilities, high authority and a good reputation in the major and high recognition in the industry. 3. Understanding of the IT architecture of the IT innovation system, systematic theoretical knowledge of the operation, maintenance, reinforcement and penetration testing of the IT system, and accurate control of the Competition.	methods of vocational skill competitions. Experience in judgment or other technical work at national or industry (provincial) vocational skill competitions.	of associate senior or above	
2	Majors related to information	1. Enthusiasm in the work, a strong sense of	Engagement in computer-rel	A technical position above lecturer	8

	security, the Internet of Things (IoT) and computer networks	responsibility, compliance with organizational arrangements, willingness to serve as a judge of the Competition, and reasonable time arrangement. 2. Basic knowledge of IT operations, a good communication ability, and timely communication with competitors and technical support providers about possible equipment and technical problems.	ated education and teaching for more than one year		
3	Majors related to information security, the	1. Theoretical knowledge, practical skills and work	Experience in judgment or other technical	A technical position above lecturer	16

	Internet of Things (IoT) and computer networks	experience in the major. 2. Good expression and communication abilities and collaboration with other judges to complete the marking of relevant items. 3. Systematic theoretical knowledge of IT operation and maintenance or penetration testing, understanding of on-site marking rules and key technical points, and objective and accurate on-site marking.	work at vocational skill competitions above provincial and municipal levels.		
4	Majors related to	1. Enthusiasm in the work, a	Engagement in teaching	Technical title above assistant	6

	computer	strong sense of responsibility, compliance with organizational arrangements, willingness to serve as a judge of the Competition, and reasonable time arrangement. 2. Good expression and communication abilities and completion of relevant encryption work at the workshop, as stipulated.	for more than one year	teacher	
Total number of judges		32			

ii. Judge marking method

The jury is responsible for marking the computer-based tests and results, and the jury president is responsible for the entire process of the Competition.

Judges should arrive at the workshop in advance. Their mobiles should be submitted to the jury president after the report for duty and returned to them at the end of marking so as to ensure the fairness and justice of the Competition.

Supervisors, judges, supervisors and the technical support team are present at the workshop, with clearly defined roles. According to the workshop environment, each supervisor is responsible for two to three teams, and five to six technical support engineers are responsible for handling all emergencies of equipment at workstations. The supervisors are responsible for communicating with the participating teams and receiving and distributing test papers and other materials; the judges are responsible for confirming equipment problems and officiating on site; and the technical support is responsible for the emergency handling of equipment after the judges' confirmation.

iii.   Result generating method

In the process of judging, all modules are marked by the members of a judge team back-to-back. Team leaders are responsible for ruling that the marks are consistent before they are submitted to the results counting team, which again checks the marks for each task and aggregates the corresponding marks for each set of competition file numbers.

After the jury president formally submits the marking results corresponding to the competition file number and reviews them for accuracy, the encryption judges decrypt the encrypted results level by level under the supervision of the supervisory staff to form a list of results, which are signed and confirmed by the jury president and supervisory arbitrator.

The marking of the Competition is strictly in accordance with the principles of fairness, impartiality and openness, and the marking criteria focus on the capabilities of the competitors in the following areas:

Competition phase	Specific content marks	Marking scheme and assessment methods

Phase I **Weight** **60%**	Installation and launch of IT innovation equipment Weight: 10%	Complete the installation and building of equipment hardware, the launch and connection of equipment and link testing, according to routing specifications. The full score is 10 points. Result marking is objective.
	Configuration of the IT innovation network. Weight: 10%	Complete the configuration of the designated network equipment. The full score is 10 points. Result marking is objective.
	Operation, maintenance and application of the IT innovation system Weight 35%	Be able to skillfully install and configure IT innovation application services install and debug databases, and apply server cluster technology, virtualization and containers, and IT innovation products. The full score is 35 points. Result marking is objective.
	Professional quality 5%	Keep the workstation clean and tidy and electronic and paper documents in order. Awareness of specifications, security and disciplines. The full score is 5 points. Result marking is objective.
Phase II **Weight** **40%**	Capture the Flag Challenge (CTF) of IT innovation Weight 40%	Penetration testing and reinforcement of MAC, DHCP, ARP and STP. Penetration testing of the service buffer overflow of the IT innovation operating system and its reinforcement. Penetration testing of the vulnerabilities of SQL Injection, Command Injection, File Upload, Directory Traversing, XSS, CSRF, Cookie Stole and Session

		Hijacking and their security programming, and application of AI in information security. The full score is 20 points. The marking of computer-based tests is objective.

Competitors should demonstrate team style, teamwork, and team communication, organizational and management abilities, and work planning abilities and pay attention to the accuracy and standardization of relevant documents.

During the Competition, it is forbidden to attack the judge's server and network connection equipment. According to the on-site security equipment alarm record, once the attack is discovered, the competitor will be penalized and required to stop the Competition for the disruption of the order of the workshop in accordance with the part of competitors' rewards and penalties in the Competition's reward and penalty measures. Besides, the competitor will be disqualified immediately and given a penalty of cancellation of his/her results, and handled by his/her school in line with its rules for the punishment for students' rule violations.

During the attack and defense phase, competitors should protect their own target machine from being attacked or hacked by other competitors.

iv. Treatment of a tie in the overall result

The score of one team is the average of the sum of the scores of the two groups. When there is a tie in the overall result of competitors, this Competition will be ranked in order of marks according to Phase III and Phase II. First, the Phase III marks are ranked, and if the Phase III marks are the same, then the Phase II marks will be ranked. If the Phase II marks are the same, then the submission time of the last correct answer in Phase II will be ranked. The CTF competition platform in Phase II records competitors' submission time. The

competitor whose submission time of the last correct answer is shorter will be ranked higher in terms of the overall result.

    v.   Results review and announcement

1. To ensure the accuracy of the evaluation results, the supervision and arbitration team will review the results of all teams (competitors) ranked in the top 30% of the overall results of the Competition; the rest of the results will be reviewed on a sampling basis, with a coverage rate of no less than 15%. Any mark errors will be promptly notified in writing to the jury president, and he/she will correct the results and sign for confirmation. If the error rate of review and sampling exceeds 5%, the jury will review all results.

After the competition results are reviewed for accuracy, the jury president, supervisors and arbitrators of the event will review and sign the results and post them on paper for announcement both within and outside the workshop. The final marking form will be submitted simultaneously to the Competition management system.

XII. Awards and Prizes

One gold medal, one silver medal and one bronze medal will be awarded for the Competition to three teams, respectively, and the teams in the top 50% of the total results (other than the Top 3) will be awarded the winning prize.

XIII. Preliminary Plans for the Competition Venue

1. In the event of equipment power failure, faults, and other accidents during the Competition, on-site judges need to promptly confirm the situation and arrange technical support personnel to handle the problem. Moreover, they should record the details and fill in the registration form for the make-up time. After reporting to the jury president for approval, they can arrange to give additional time to the corresponding competitors to make up for the delay.

2. Adequate spare PC and equipment should be reserved and can be used by technical support staff to timely replace those with power failure and faults, upon recognition by on-site judges.

3. If there are major emergencies and major security problems in the Competition, the Competition will be suspended with the consent of the Executive Committee and the expert panel. Relevant leaders, such as the jury president, team leaders, the head of the technical support company, leaders of the Executive Committee and the head of the host school will coordinate and solve the problem; if it cannot be resolved, the Competition will be suspended and the decision on whether to cancel the Competition will be made by the executive committee of the division. After the event, the executive committee of the division should report the details to the Executive Committee.

4. If accidental injury, unexpected illness and other major incidents occur during the Competition, the jury president should immediately suspend the relevant personnel from the Competition. The school doctor at the medical station of the host school is the first aid to rescue the patient, and if it is a serious case, the patient must be sent to the hospital by calling 120.

XIV. Safety

Event safety is a prerequisite for the smooth running of the Competition. It is the core issue that must be taken into consideration in the preparation and operation of the Competition.

i. Organization

The Executive Committee organizes specialized agencies responsible for the competition safety within the division, and establishes coordination mechanisms for public security, fire prevention, judicial administration, traffic, sanitation, food, quality assurance and other relevant departments to ensure the safety of the competition. It also formulates contingency plans to deal with emergencies in a timely manner. The corresponding safety management norms, procedures and contingency plans for emergencies are formulated to ensure the safety in the preparation and implementation of the competition for the whole process.

ii.   Competition design

1. The equipment and devices involved in the competition are in compliance with the relevant national safety regulations. Fully taking into consideration the Competition content and the possible dangerous factors of the equipment and consumables used, the expert panel of the Competition takes effective precautions to ensure the safety of the competitors in their preparation and competition by improving the design and avoiding risks. Hazard tips and precautions will be specified in the technical documentation of the Competition.

2. The technical documents contain national (or industry) norms, regulations and qualification requirements related to occupational job safety.

3. The Executive Committee will conduct judge training and safety training for all judges of this category and safety training for service personnel before the event. The Competition originates from the production process of the

formation and operation and maintenance of IT innovation products. According to the Labor Law of the People's Republic of China and other laws and regulations, a comprehensive accident prevention policy has been established, and the competitors are trained before the start of the Competition to avoid personal injury accidents.

4. The Executive Committee will develop a special plan to ensure the security of the Test Projects, their storage and judging process.

iii. Competition environment

1. Environmental safety guarantee

The organizing and management personnel of the Competition formulate security guidelines, hazard avoidance methods and contingency plans, set up emergency evacuation routes and channels, and ensure that all vehicles and personnel entering the workshop during the Competition must present their permits. It is strictly forbidden to carry flammable and explosive materials, controlled knives and other dangerous goods and other items strictly prohibited by the competition into the workshop. Crowding, stampede, earthquake, and fire should be handled effectively according to contingency plans.

2. Electrical safety guarantee

Installation of UPS: UPS is used to prevent the loss of system data due to sudden power failure at the site, rated power: 3 KVA, backup time: two hours, battery type: output voltage: 230 V ± 5% V; mains power is provided using dual power supply.

3. Operational safety guarantee

Before the Competition, the competitors should be trained on the safety of computer, network equipment, tools and other operation, and educated on safe operation to ensure that each team member can safely operate the equipment during the Competition. Before the Competition, the judge reads out safety

precautions with emphasis on safety rules for fire and electricity.

Local public security, health departments and insurance companies are invited to help support the whole process.

The safety of the competitors traveling from the participating school to the workshop is the responsibility of the host school, and the safety of the competitors during the Competition is the responsibility of the Executive Committee of the Competition.

4. The Executive Committee must organize a special inspection on the workshop, accommodation places and transport before the Competition, and make explicit safety requirements. The arrangement of the workshop, the equipment and facilities within the workshop, should comply with the relevant national safety regulations. The organizer must exclude hazards in accordance with the requirements of the Executive Committee before the Competition.

5. According to the requirements of the Executive Committee of the Competition and the local department of education, the pandemic prevention and control work should be carried out properly.

6. A cordon should be set up around the workshop to prevent the entry of unauthorized persons in case of accidents. The necessary labor protection should be provided for the competitors with reference to the requirements of the relevant occupational posts within the competition site. In the section with dangerous operation, the judges should take strict precautions against the wrong operation of the competitors.

7. The organizer should provide conditions to ensure the implementation of the contingency plan. For competitions involving work at height, possible falling objects, large electricity consumption, fire prone and other circumstances, policies and plans must be specified, and first aid personnel and facilities must be equipped.

8. The Executive Committee must formulate the staff evacuation plan for the open workshop and experience area in conjunction with the organizer. In

addition to complete indication signs, additional guidance personnel shall be assigned and alternate lanes shall be opened in areas where there are crowded and intersecting traffic and pedestrian flow in the workshop environment.

9. During the Competition, the organizer of the Competition must take key positions in the management of the workshop, increase efforts and establish a security management log.

10. It is strictly forbidden for competitors and judges to bring communication and photographic recording equipment or recorders into the workstations and workplaces. If necessary, it will be allocated and managed by the workshop. Security check equipment will be deployed as needed to check the people entering the important parts of the workshop.

iv. Living conditions

1. During the Competition, in principle, the event organizer will arrange the food and accommodation for the competitors and coaches. (The expense should be borne by the competitors and coaches). The organizer must respect the culture and beliefs of different nationalities and arrange the food and accommodation for the competitors and coaches of ethnic minorities and other countries.

2. The place of accommodation arranged during the Competition should have the business permit for hotel/accommodation. If a school dormitory is used for accommodation, the Executive Committee and the school providing the dormitory will be jointly responsible for the accommodation, health and food safety during the Competition.

3. Transport safety of organized visits and observation activities during the Competition is under the responsibility of the Executive Committee. The Executive Committee and the organizer must ensure the transport safety for competitors, coaches and judges, and staff during the Competition.

4. The security management, in addition to the necessary security quarantine measures that can be taken, should strictly comply with the relevant

national laws and regulations to protect personal privacy and personal freedom.

 v.   Team responsibility

 1. Each province, autonomous region and municipality must purchase personal accident insurance for the competitors during the Competition when organizing the teams.

 2. After the teams of each province, autonomous region and municipality are formed, the relevant management policy must be formulated and safety education should be provided to all competitors and coaches.

 3. The team leaders must strengthen the safety management of the competitors and achieve the alignment with the safety management of the workshop.

 vi.   Emergency response

 If an accident occurs during the Competition, whoever finds it should report to the Executive Committee immediately, and also take measures to avoid further deterioration. The Executive Committee should immediately activate the contingency plan to address the problem and report to the Executive Committee of the division. Categories with major safety problems can be suspended, and the decision on whether to cancel the events will be made by the executive committee of the division. After the event, the executive committee of the division should report the details to the Executive Committee.

 vii.   Penalties

 1. Where a major safety issue is found, the organizer will be disqualified from hosting the Competition.

 2. If a major safety problem is caused by a team, the team will be disqualified from participating in the Competition.

 3. Teams involved in major safety problems may be disqualified from continuing with the Competition if they are alerted and warned by the staff but of no avail.

 Event staff who violate the rules will be held accountable according to the

corresponding policies. Where the circumstances are serious and cause major security incidents, the relevant parties will be held legally accountable by the judicial authorities.

XV. Competition Notice

i. Notice for teams

1. Teams should attend the closing ceremony and other events organized by the organizers.

2. During the event, team leaders and other team members are not allowed to contact the judges personally, and anyone found to have falsified will be disqualified and their results will be invalid.

3. All competitors must complete the evaluation of the Competition in accordance with the requirements of the Skill-Specific Competition Rules.

4. For the teams that hamper the fairness of the Competition and hinder the normal progress of the Competition, depending on the severity of the circumstances, they will be subject to warnings, cancellation of the competition results and notice of criticism in accordance with relevant policies.

ii. Notice for instructors

1. Instructors should reasonably formulate training programs according to the professional teaching plan and the Skill-Specific Competition Rules, carefully offer training, overcome utilitarian thinking, and avoid learning for the sake of competition and substituting learning with competition.

2. Instructors should check the notice and the Competition content on the official website of the Competition in time, study and master the rules, technical specifications and requirements of the workshop, and make all technical preparations and competition preparations before the Competition.

3. Instructors should have the competitors properly insured according to the requirements of the Skill-Specific Competition Rules and make active efforts to educate the competitors about safety.

iii. Notice for competitors

1. Competitors should fill in personal information truthfully according to the relevant requirements, otherwise the eligibility for the Competition will be canceled.

2. Competitors need to hold a unified printed entry card and valid IDs to participate in the Competition.

3. Competitors should conscientiously study and understand the relevant documents of the Competition, consciously abide by the discipline of the Competition, follow the instructions, heed the arrangements, and compete in a civilized manner.

4. Competitors should not bring any electronic devices and other materials and supplies to the workshop.

5. Competitors should arrive at the workshop in accordance with the specified time, register against their entry cards and IDs, enter as required, and are not allowed to arrive late or leave early.

6. Competitors should raise role awareness and allocate tasks and cooperate in a scientific and reasonable manner.

7. Competitors should be seated in the designated position according to the relevant requirements.

8. Competitors must start the Competition after confirming the Competition content and on-site equipment are error-free. In the course of the Competition, if the operation cannot continue due to computer software or hardware failure, a backup computer will be activated upon confirmation by the jury president.

9. Each competitor must operate the competition equipment according to the specification requirements. In the event of any serious safety accident occur due to improper operation of competitor, the competitor will be disqualified immediately upon approval by the jury president.

10. Competitors should read the requirements for naming the competition documents in the Test Projects carefully, and should not indicate any information about the competitor's place name, school name, full name and competition number, in the submitted competition documents, otherwise the competition results will be canceled.

11. At the end of the Competition, all competitors should stand up and terminate the operation. The materials and tools should be placed neatly on the work surface, and counted by the staff before competitors can leave the workshop, and no materials are allowed to be taken away when they leave the workshop.

12. During the Competition, without the approval of the Executive Committee, the competitors should not accept interviews related to the Competition content conducted by other organizations and individuals. Competitors are not allowed to publish information about the Competition without permission.

iv. Notice for staff

1. The concept of service should be established, and all work should be done for the benefit of the competitors. With a high degree of responsibility, a serious attitude and a rigorous and meticulous style, under the leadership of the Executive Committee, they should conscientiously perform their duties in accordance with their respective responsibilities and requirements.

2. All staff must wear badges, be faithful to their duties, handle the matter impartially and preserve confidentiality.

3. They should pay attention to their good manners, maintain a good image and be familiar with the Competition Notice.

4. They should abide by the discipline and rules of the Competition, obey the arrangement and allocation of work, and ensure the smooth running of the Competition.

5. They should arrive at the workshop 30 minutes in advance, and strictly adhere to their work posts. They should not arrive late or leave early, nor leave their posts without reason. For special circumstances, they should ask for leave from the head of the working group.

6. They should be familiar with the competition rules, strictly follow the work procedures and relevant regulations, and in case of emergencies, organize and direct the evacuation of personnel in accordance with the contingency plan to ensure the safety of personnel.

7. If the staff commits fraud in the Competition, they will be immediately disqualified from the work and given a serious penalty.

8. They should keep the communication smooth, obey the unified leadership, strictly abide by the competition discipline, strengthen the coordination and cooperation, and improve the efficiency.

XVI. Appeal and Arbitration

Each team can submit an appeal to the supervision and arbitration team of the Competition about the instruments, equipment, fixtures, materials, objects, computer software and hardware, tools and supplies used in the competition, competition officiating, workshop management, and non-standard behavior of the staff that do not conform to the competition rules. The subject of the appeal is the team leader. Team leaders may submit written appeal to the supervision and arbitration team within two hours after the end of the Competition (when the competitors have completed the Competition).

A written appeal should give a full and factual account of the incident, time, personnel involved and the basis for the appeal, and should be signed by the team leader. Non-written appeals will not be accepted.

The supervision and arbitration team will organize a review within two hours after receiving the appeal report and inform the complaining party in writing of the review result in a timely manner. If the complaining party still

disagrees with the review result, the team leader may submit an appeal to the Supervisory Arbitration Committee of the division. The arbitration award of the Supervisory Arbitration Committee of the division shall be final.

The arbitration award should be signed for by the appealing party and cannot be received on his/her behalf. If the appealing party leaves at the agreed time and place, he/she is considered to have waived the appeal.

The complainant may file a waiver of appeal at any time and may not take excessive action to disrupt the workshop for any reason.

XVII. Competition Observation

An observation area will be designated for this Competition, and a large screen will be used to display the progress of information security attack and defense battles in real time.

The competition environment is designed according to the needs of the competition and the characteristics of the profession, and part of the workshop is opened safely under the premise that the competition is not disturbed. Observers need to wear observer's badge and be led by the staff to the site along the designated route and in the designated area.

XVIII. Live Competition

Before the Competition, key aspects such as equipment installation and debugging, and software installation are live recorded. The entire competition process is videotaped. The opening and closing ceremonies, and competition process are live broadcast, and the manual marking process is videotaped.

After the Competition, video materials of interviews with outstanding competitors, outstanding instructors, and those of expert comments by judges will be produced for this Competition.

XIX. Resource Conversion

In accordance with relevant requirements, the Executive Committee of the Competition will submit a plan for resource conversion of the competition

results (in the following table) to the Office of the Executive Committee of the World Vocational College Skills Competition after the Competition. Resource conversion should be completed within half a year. Converted resources should be uploaded to an online information release platform designated by the Competition.

Name of resources			Form of expression	Number of resources	Resource requirements	Completion time
Basic resources	Charm show	Competition promotion	Video	1	15 minutes Above	30 days after the Competition
		Charm show	Video	1	10 minutes Above	30 days after the Competition
	Skill summary	Skill introduction Key points of skills Assessment indicators	Text information	3	Electronic information	60 days after the Competition
	Teaching resources	Professional textbooks	Text information	1	Electronic information	90 days after the Competition
Extended resource	Case library		Text information	1	Electronic information	60 days after the Competition
	Question libraries		Text informatio	1	Electronic information	60 days after the

s		n			Competition

After the Competition, it is also necessary to improve the building of teaching staff, and facilitate the effective application of resource conversion in teaching. After the Competition is completed in 2022, two seminars are planned to be held, in addition to two teacher training sessions. The training covers the application of information security in work and life, the operation and maintenance of the IT innovation system, the information security practices of the IT innovation system, and the information security practices of the IT innovation network.

No.	Event name	Planned time	Notes
1	Seminar session 1	July 2022	
2	Teacher training session 1	July 2022	
3	Teacher training session 2	October 2022	
4	Seminar session 2	December 2022	

XX. Miscellaneous